



**US Army Corps
of Engineers**

Construction Engineering
Research Laboratories

**USACERL Technical Report 96/39
February 1996**

Laboratory Evaluation of Commercial Epoxy Zinc-Rich Primers for Civil Works Applications

by
Timothy D. Race

The Corps of Engineers' specification for epoxy zinc-rich primer designates E-303d for application as a primer for topcoats. However, E-303d has a relatively high volatile organic compound (VOC) content, which will likely be limited by a forthcoming U.S. Environmental Protection Agency (USEPA) national rule for VOC content of architectural and industrial maintenance coatings. A possible alternative to E-303d is an epoxy coating enhanced with a zinc-rich primer. This research evaluated the performance and potential utility of commercially available zinc-rich epoxy primers as replacements for E-303d.

Ten commercially available low-VOC epoxy zinc-rich primers were evaluated using laboratory tests designed to simulate three exposure environments: (1) fresh water immersion, (2) salt water immersion, and (3) atmospheric weathering. Overall, the commercial primers performed nearly as well as E-303d. This study found that multiple low-VOC commercial equivalents to E-303d are available for each exposure environment, and recommended field tests of the most promising primers.

19960408 097

The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products. The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

DESTROY THIS REPORT WHEN IT IS NO LONGER NEEDED

DO NOT RETURN IT TO THE ORIGINATOR

USER EVALUATION OF REPORT

REFERENCE: USACERL Technical Report 96/39, *Laboratory Evaluation of Commercial Epoxy Zinc-Rich Primers for Civil Works Applications*

Please take a few minutes to answer the questions below, tear out this sheet, and return it to USACERL. As user of this report, your customer comments will provide USACERL with information essential for improving future reports.

1. Does this report satisfy a need? (Comment on purpose, related project, or other area of interest for which report will be used.)

2. How, specifically, is the report being used? (Information source, design data or procedure, management procedure, source of ideas, etc.)

3. Has the information in this report led to any quantitative savings as far as manhours/contract dollars saved, operating costs avoided, efficiencies achieved, etc.? If so, please elaborate.

4. What is your evaluation of this report in the following areas?

a. Presentation: _____

b. Completeness: _____

c. Easy to Understand: _____

d. Easy to Implement: _____

e. Adequate Reference Material: _____

f. Relates to Area of Interest: _____

g. Did the report meet your expectations? _____

h. Does the report raise unanswered questions? _____

i. General Comments. (Indicate what you think should be changed to make this report and future reports of this type more responsive to your needs, more usable, improve readability, etc.)

5. If you would like to be contacted by the personnel who prepared this report to raise specific questions or discuss the topic, please fill in the following information.

Name: _____

Telephone Number: _____

Organization Address: _____

6. Please mail the completed form to:

Department of the Army
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES
ATTN: CECER-TR-I
P.O. Box 9005
Champaign, IL 61826-9005

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave Blank)	2. REPORT DATE February 1996	3. REPORT TYPE AND DATES COVERED Final	
4. TITLE AND SUBTITLE Laboratory Evaluation of Commercial Epoxy Zinc-Rich Primers for Civil Works Applications		5. FUNDING NUMBERS CWIS 31205	
6. AUTHOR(S) Timothy D. Race			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Construction Engineering Research Laboratories (USACERL) P.O. Box 9005 Champaign, IL 61826-9005		8. PERFORMING ORGANIZATION REPORT NUMBER TR 96/39	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Headquarters, U.S. Army Corps of Engineers (HQUSACE) ATTN: CECW-EE 20 Massachusetts Ave., NW. Washington, DC 20314-1000		10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES Copies are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.		12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) The Corps of Engineers' specification for epoxy zinc-rich primer designates E-303d for application as a primer for topcoats. However, E-303d has a relatively high volatile organic compound (VOC) content, which will likely be limited by a forthcoming U.S. Environmental Protection Agency (USEPA) national rule for VOC content of architectural and industrial maintenance coatings. A possible alternative to E-303d is an epoxy coating enhanced with a zinc-rich primer. This research evaluated the performance and potential utility of commercially available zinc-rich epoxy primers as replacements for E-303d. Ten commercially available low-VOC epoxy zinc-rich primers were evaluated using laboratory tests designed to simulate three exposure environments: (1) fresh water immersion, (2) salt water immersion, and (3) atmospheric weathering. Overall, the commercial primers performed nearly as well as E-303d. This study found that multiple low-VOC commercial equivalents to E-303d are available for each exposure environment, and recommended field tests of the most promising primers			
14. SUBJECT TERMS volatile organic compounds paints coatings		15. NUMBER OF PAGES 70	
		16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT SAR

Foreword

This study was conducted for The Electrical and Mechanical Branch, Engineering Division, Directorate of Civil Works, Headquarters, U.S. Army Corps of Engineers (HQUSACE) under "Civil Works Investigations and Studies" (CWIS) Work Unit 31205, "Developing High Performance Coatings." The technical monitors were R. Kinsel and J. Gilson, CECW-EE

The work was performed by the Materials Science and Technology Division (FL-M) of the Facilities Technology Laboratory (FL), U.S. Army Construction Engineering Research Laboratories (USACERL). The USACERL principal investigator was Timothy D. Race. Ellen G. Segan is Acting Chief, CECER-FL-M; Donald F. Fournier is Acting Operations Chief, CECER-FL; and Alvin Smith is Acting Chief, CECER-FL. The USACERL technical editor was William J. Wolfe, Technical Resources Center.

COL James T. Scott is Commander and Acting Director, and Dr. Michael J. O'Connor is Technical Director of USACERL.

Contents

SF 298	1
Foreword	2
1 Introduction	5
Background	5
Objective	5
Approach	5
Scope	6
Mode of Technology Transfer	6
2 Procedures	7
Test Coating Application	7
Selection of Test Methods	8
Salt Water Immersion	9
Fresh Water Immersion	9
Cyclic Corrosion Weathering	9
3 Results and Discussion	10
Salt Water Immersion	10
Fresh Water Immersion	12
Cyclic Corrosion Weathering	13
4 Conclusions and Recommendations	15
References	17
Appendix: Test Results	18
Distribution	

1 Introduction

Background

The Corps of Engineers currently uses its own specification for epoxy zinc-rich primer (E-303d), which is applied as a primer for topcoats Mil-P-24441 *Paint, Epoxy-Polyamide* and SSPC Paint Specification No. 16, *Coal Tar Epoxy-Polyamide Black (or Dark Red) Paint (1991)*. These coating systems are used for a variety of applications including fresh and salt water immersion and atmospheric weathering.

However, E-303d has a relatively high volatile organic compound (VOC) content, typically 500-600 grams per liter as applied. The U.S. Environmental Protection Agency (EPA) will propose a national rule for VOC content of architectural and industrial maintenance coatings. The proposed VOC content requirement for industrial maintenance primers will likely be 350 grams per liter. When this national rule is implemented in 1996, the Corps will no longer be able to apply E-303d. Therefore, an appropriate replacement is needed.

Objective

The objective of this research was to evaluate the performance and potential utility of commercially available epoxy zinc-rich primers as replacements for E-303d.

Approach

Ten commercially available low-VOC epoxy zinc-rich primer coatings were applied to steel test plates and topcoated with MIL-P-24441 and SSPC Paint 16. The test coatings were evaluated using laboratory tests designed to simulate three exposure environments, fresh and salt water immersion and atmospheric weathering. Test panels were evaluated periodically for degree of rusting, blistering, and rust undercutting. Standard Corps of Engineers epoxy systems were used as experimental controls.

Scope

This study was limited to a laboratory evaluation. Laboratory test exposures can be used to measure the relative performance levels of different coatings. However, care should be taken not to extrapolate the results of laboratory experiments to actual field performance. Field tests should be conducted to fully validate the utility of any coating technology. The results contained in this report do not represent an endorsement of specific products or manufacturers.

Mode of Technology Transfer

It is recommended that the information contained in this report be used as a basis for further study to determine, on a preliminary basis, the suitability of low-VOC commercial epoxy zinc-rich primers as replacements for Corps of Engineers specification E-303d.

2 Procedures

Test Coating Application

Ten commercial epoxy zinc-rich primers were mixed and applied in accordance with the manufacturers recommendations. Each primer was topcoated with MIL-P-24441 (Formula 152, Type IV) and SSPC Paint 16 per the requirements of coating systems 21-A-Z and 6-A-Z respectively. Corps of Engineers Paint Systems Number 6-A-Z and 21-A-Z were used as experimental controls. System 6-A-Z consists of two coats of E-303d primer and two coats of SSPC Paint 16, coal tar epoxy coating. System 21-A-Z consists of two coats of E-303d primer and two coats of MIL-P-24441, epoxy-polyamide topcoat. Coatings were spray applied to SP 1 and SP 5 cleaned hot rolled commercial grade carbon steel test panels measuring 3 x 6 x 0.125 in.* Table 1 lists the test coatings.

The dry film coating thickness of the test and control coatings were measured in accordance to ASTM D 1186, *Standard Test Methods for, Nondestructive Measurement*

Table 1. Commercial epoxy zinc-rich coatings.

Manufacturer	Product	VOC (g/L)
Ameron Protective Coatings	Amercoat 68HS	288
Carboline	Carboline 858	303
Deft, Inc.	44-G-Y Water Reducible	240
Devoe Coatings Company	Catha-Coat 303H	282
Gavlon Industries	Gavlon 9198 Primer	324
Keeler & Long, Inc.	No. 7600 Kolor-Poxy H.S. Primer	260
Poly-Carb, Inc.	Mark-59.3	0
International Paint	325 Magna-Zinc	234
Sherwin-Williams	Zinc Clad VIII	86
The Warfield Comp., Inc.	Alocit Aquacoat 28.15 Zinc	N/A

* 1 in. = 25.4 mm.

of *Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Base* (1987). The average dry film thicknesses for each coating system are listed in Table 2.

Selection of Test Methods

Laboratory test methods were selected that simulate the expected service environments for epoxy zinc-rich coated steel, including fresh and salt water immersion and atmospheric weathering. Fresh and salt water immersion are readily replicated in the laboratory using aerated tap water and synthetic sea water. Atmospheric exposure may be simulated using an accelerated test method that cycles the test panels through alternating ultraviolet radiation and salt fog exposures.

Table 2. Paint dry film thicknesses.

Coating System		Coating Thickness (0.001 in)		
Primer	Topcoat	Primer	Topcoat	System
E-303d	Mil-P-24441	3.1	8.0	11.1
E-303d	SSPC Paint 16	3.0	14.0	17.0
Amercoat 68HS	Mil-P-24441	3.5	7.6	11.1
Amercoat 68HS	SSPC Paint 16	3.6	15.0	18.6
Carboline 858	Mil-P-24441	3.3	6.9	10.2
Carboline 858	SSPC Paint 16	3.4	15.6	19.0
44-G-Y Water Reducible	Mil-P-24441	3.1	7.5	10.6
44-G-Y Water Reducible	SSPC Paint 16	3.2	14.7	17.9
Catha-Coat 303H	Mil-P-24441	3.1	7.8	10.9
Catha-Coat 303H	SSPC Paint 16	3.1	14.9	18.0
Gavlon 9198 Primer	Mil-P-24441	3.3	7.6	10.9
Gavlon 9198 Primer	SSPC Paint 16	2.9	15.8	18.7
No. 7600 Kolor-Poxy	Mil-P-24441	3.1	7.7	10.8
No. 7600 Kolor-Poxy	SSPC Paint 16	3.1	14.7	17.8
Mark-59.3	Mil-P-24441	3.4	7.6	11.0
Mark-59.3	SSPC Paint 16	3.4	14.8	18.2
325 Magna-Zinc	Mil-P-24441	3.3	7.8	11.1
325 Magna-Zinc	SSPC Paint 16	3.0	15.9	18.9
Zinc Clad VIII	Mil-P-24441	3.2	7.3	10.5
Zinc Clad VIII	SSPC Paint 16	3.2	15.7	18.9
Alocit Aquacoat 28.15	Mil-P-24441	3.1	7.2	10.3
Alocit Aquacoat 28.15	SSPC Paint 16	3.4	14.3	17.7

Salt Water Immersion

Six test panels of each of the control and experimental systems were immersed in synthetic sea water prepared in accordance with section 7, Salt Solution, of ASTM B 117 *Standard Test Method of Salt Spray (Fog) Testing* (1990) for a period of 120 days. All test panels were scribed prior to immersion exposing an area approximately one-eighth by 2 in. Test panels were evaluated after 7, 60, and 120 days for degree of rusting and blistering in accordance with ASTM D 610 *Standard Method for Evaluating Degree of Rusting on Painted Surfaces* (1989) and ASTM D 714 *Standard Test Method for Evaluating Degree of Blistering of Paints* (1987). Degree of undercutting was measured after 120 days in accordance with ASTM D 1654 *Standard Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments* (1992).

Fresh Water Immersion

The same tests were performed for panels immersed in fresh tap water as for salt water immersion.

Cyclic Corrosion Weathering

Six scribed test panels of each control and test system were subjected to 16 weeks of cyclic corrosion testing. The test cycle consisted of 1 week in an ultraviolet condensation cabinet per ASTM G 53 *Standard Practice for Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials* (1991) using UV-A bulbs (4 hours UV at 60 °C, 4 hours condensation at 50 °C) followed by 1 week of alternating salt spray at 30 °C (4.0 g/L ammonium sulfate, 0.5 g/L sodium chloride) for 1 hour followed by 1 hour of forced air drying at 40 °C (modified ASTM G 85 Annex A5.). The test panels were evaluated for degree of rusting and blistering after 1, 2, 4, 8, 12, and 16 weeks. Degree of undercutting was measured after 16 weeks.

3 Results and Discussion

Salt Water Immersion

Degree of blistering adjacent to the scribe and rusting were determined for the test and control coatings after 7, 60, and 120 days in salt water immersion. Rust undercutting at the scribe was measured after 120 days. The results are summarized in Table 3. The rust undercutting data has been converted to integer values from zero to 10, as described in ASTM D 1654, with the exception that the maximum rather than the mean scribe creepage is used. The blistering data is similarly converted by taking the average of the sum of the blister size and the converted blister density. The converted blister density is an integer value from zero to 10 with very dense blistering equal to zero and no blistering equal to 10. Rust, blister, and undercut values are the averages of six test specimens for each coating system. The composite score, shown in the last column, is the sum of numerical rust, blister, and undercut ratings, at 120 days. A composite score of 30 corresponds to no coating degradation. The raw data for the salt water immersion tests are presented in the Appendix to this report.

Early blistering adjacent to the scribe is a good indicator of poor long-term performance for salt water immersion applications. In general, the commercial epoxy zinc-rich primer systems show good resistance to blistering in salt water immersion. Coating film defects resulting from damage during handling and erection are inevitable. Degree of rust undercutting measured in conjunction with coating film defects is an important measure of long-term coating performance. None of the coating systems evaluated exhibited undercutting at the scribe.

Both of the control systems showed no degradation after 120 days and had perfect composite scores of 30. Of the 20 test systems (10 primers each with two different topcoats), 16 had perfect composite scores. Four of the commercial primers topcoated with MIL-P-24441 exhibited blistering adjacent to the scribe. All of the primers topcoated with SSPC Paint No. 16 had perfect scores. In a previous study, SSPC Paint No. 16 without a zinc-rich primer, had a perfect composite score of 30 after 112 days of salt water immersion (Race and Boy 1995). This result indicates that SSPC Paint No. 16 provides excellent corrosion resistance based on its barrier properties alone.

Table 3. 120-day salt water immersion test results.

Primer	Topcoat	Rust	Blister	Undercut	Total
E-303d	Mil-P-24441	10	10	10	30
E-303d	SSPC Paint 16	10	10	10	30
Amercoat 68HS	Mil-P-24441	10	10	10	30
Amercoat 68HS	SSPC Paint 16	10	10	10	30
Carboline 858	Mil-P-24441	10	10	10	30
Carboline 858	SSPC Paint 16	10	10	10	30
44-G-Y Water Reducible	Mil-P-24441	10	4.5	10	24.5
44-G-Y Water Reducible	SSPC Paint 16	10	10	10	30
Catha-Coat 303H	Mil-P-24441	10	8.5	10	28.5
Catha-Coat 303H	SSPC Paint 16	10	10	10	30
Gavlon 9198 Primer	Mil-P-24441	10	10	10	30
Gavlon 9198 Primer	SSPC Paint 16	10	10	10	30
No. 7600 Kolor-Poxy	Mil-P-24441	10	10	10	30
No. 7600 Kolor-Poxy	SSPC Paint 16	10	10	10	30
Mark-59.3	Mil-P-24441	10	10	10	30
Mark-59.3	SSPC Paint 16	10	10	10	30
325 Magna-Zinc	Mil-P-24441	10	8.5	10	28.5
325 Magna-Zinc	SSPC Paint 16	10	10	10	30
Zinc Clad VIII	Mil-P-24441	10	9.25	10	29.25
Zinc Clad VIII	SSPC Paint 16	10	10	10	30
Alocit Aquacoat 28.15	Mil-P-24441	10	10	10	30
Alocit Aquacoat 28.15	SSPC Paint 16	10	10	10	30

Not surprisingly then, all of the zinc-rich primed test systems evaluated in this study have excellent corrosion resistance. Paint System 21 (MIL-P-24441 Formulas 150 and 152) was also evaluated in the previous study. This system showed both blistering (4.0) and undercutting (8.5) at the scribe with a composite score of just 22.5 after 112-days in salt water immersion. All of the commercial primers with the MIL-P-24441 topcoat performed better in this study than MIL-P-24441 without the zinc-rich primer in the previous study. Each primer prevented undercutting at the scribe whereas unprimed MIL-P-24441 did exhibit undercutting at the scribe. Not surprisingly, zinc-rich primed systems with MIL-P-24441 topcoat, do not perform as well as zinc primed systems topcoated with SSPC Paint No. 16.

Fresh Water Immersion

Degree of rusting and blistering were determined for the test and control coatings after 7, 60, and 120 days in fresh water immersion. Rust undercutting was measured after 120 days. The results are shown in Table 4. The raw data is presented in the Appendix to this report. The composite score for each test panel is presented in the last column of the table.

In general the commercial primer systems perform well in fresh water immersion. None of the test coatings or controls exhibited rust undercutting at the scribe at the completion of the 120-day test period. One primer showed blistering adjacent to the scribe when topcoated with both the standard coatings. Notably this primer topcoated with MIL-P-24441 also blistered in salt water immersion.

Table 4. 120-day fresh water immersion results.

Primer	Topcoat	Rust	Blister	Undercut	Total
E-303d	Mil-P-24441	10	10	10	30
E-303d	SSPC Paint 16	10	10	10	30
Amercoat 68HS	Mil-P-24441	10	10	10	30
Amercoat 68HS	SSPC Paint 16	10	10	10	30
Carboline 858	Mil-P-24441	10	10	10	30
Carboline 858	SSPC Paint 16	10	10	10	30
44-G-Y Water Reducible	Mil-P-24441	10	4.5	10	24.5
44-G-Y Water Reducible	SSPC Paint 16	10	5.5	10	25.5
Catha-Coat 303H	Mil-P-24441	10	10	10	30
Catha-Coat 303H	SSPC Paint 16	10	10	10	30
Gavlon 9198 Primer	Mil-P-24441	10	10	10	30
Gavlon 9198 Primer	SSPC Paint 16	10	10	10	30
No. 7600 Kolor-Poxy	Mil-P-24441	10	10	10	30
No. 7600 Kolor-Poxy	SSPC Paint 16	10	10	10	30
Mark-59.3	Mil-P-24441	10	10	10	30
Mark-59.3	SSPC Paint 16	10	10	10	30
325 Magna-Zinc	Mil-P-24441	10	10	10	30
325 Magna-Zinc	SSPC Paint 16	10	10	10	30
Zinc Clad VIII	Mil-P-24441	10	10	10	30
Zinc Clad VIII	SSPC Paint 16	10	10	10	30
Alocit Aquacoat 28.15	Mil-P-24441	10	10	10	30
Alocit Aquacoat 28.15	SSPC Paint 16	10	10	10	30

Cyclic Corrosion Weathering

Test coatings and controls were evaluated for 16 weeks in a cyclic salt fog/UVCON corrosion cycle designed to simulate the long-term effects of atmospheric weathering. Test panels were evaluated for rusting and blistering after 1, 2, 4, 8, 12, and 16 weeks. Rust undercutting at the scribe was measured at the completion of the 16-week test. The results are summarized in Table 5. The Appendix to this report lists the raw data for the cyclic corrosion testing.

Cyclic corrosion testing was used to predict the relative performance of the control and test coatings in atmospheric weathering. All of the test panels had perfect blister and rust ratings at the completion of the cyclic corrosion test. The two controls and 10 of the commercial systems did not exhibit undercutting at the scribe and had perfect composite scores. Of the 10 commercial systems with perfect composite scores, seven were topcoated with MIL-P-24441 and three with SSPC Paint No. 16. All the primers

Table 5. 112-day cyclic corrosion weathering.

Primer	Topcoat	Rust	Blister	Undercut	Total
E-303d	Mil-P-24441	10	10	10	30
E-303d	SSPC Paint 16	10	10	10	30
Amercoat 68HS	Mil-P-24441	10	10	10	30
Amercoat 68HS	SSPC Paint 16	10	10	10	30
Carboline 858	Mil-P-24441	10	10	10	30
Carboline 858	SSPC Paint 16	10	10	10	30
44-G-Y Water Reducible	Mil-P-24441	10	10	10	30
44-G-Y Water Reducible	SSPC Paint 16	10	10	9.7	29.7
Catha-Coat 303H	Mil-P-24441	10	10	10	30
Catha-Coat 303H	SSPC Paint 16	10	10	7.3	27.3
Gavlon 9198 Primer	Mil-P-24441	10	10	9.0	29.0
Gavlon 9198 Primer	SSPC Paint 16	10	10	7.5	27.5
No. 7600 Kolor-Poxy	Mil-P-24441	10	10	10	30
No. 7600 Kolor-Poxy	SSPC Paint 16	10	10	9.0	29.0
Mark-59.3	Mil-P-24441	10	10	10	30
Mark-59.3	SSPC Paint 16	10	10	7.3	27.3
325 Magna-Zinc	Mil-P-24441	10	10	9.7	29.7
325 Magna-Zinc	SSPC Paint 16	10	10	7	27.0
Zinc Clad VIII	Mil-P-24441	10	10	10	30
Zinc Clad VIII	SSPC Paint 16	10	10	10	30
Alocit Aquacoat 28.15	Mil-P-24441	10	10	9.7	29.7
Alocit Aquacoat 28.15	SSPC Paint 16	10	10	6.3	26.3

evaluated have equal or better performance when topcoated with MIL-P-24441 compared to the same primer topcoated with SSPC Paint No. 16. The average composite scores for commercial primers topcoated with MIL-P-24441 and SSPC Paint No. 16 are 29.8 and 28.4 respectively.

Cyclic corrosion resistance of paint System 21 (MIL-P-24441 Formulas 150 and 152) and SSPC Paint No. 16 were evaluated in a previous study. SSPC Paint No. 16 exhibited blistering (9.3) and undercutting (5.8) adjacent to the scribe after 14 weeks of testing. System 21 also showed blistering (3.7) and undercutting (4.3). The composite scores for Paint No. 16 and System 21 were 25.1 and 18.1 respectively. All of the commercial primer systems performed better in this study than the unprimed system analogs in the previous study. The commercial primers eliminate blistering and reduce undercutting at the scribe.

4 Conclusions and Recommendations

This research evaluated the performance and potential utility of commercially available low-VOC epoxy zinc-rich primers as replacements for E-303d, which is used with two different topcoats, MIL-P-24441 and SSPC Paint No. 16. Each commercial primer was topcoated with these materials and exposed in fresh and salt water immersion and cyclic corrosion weathering tests. Performance was measured in terms of rusting, blistering, and undercutting and was compared to the standard coating systems.

For the salt water immersion exposure, commercial primers topcoated with SSPC Paint No. 16 were generally superior to those topcoated with MIL-P-24441. All of the commercial primers topcoated with SSPC Paint No. 16 performed as well as E-303d topcoated with SSPC Paint No. 16. For short term salt water exposures, the commercial analogs perform as well as E-303d topcoated with SSPC Paint No. 16, and with some exceptions, as well as E-303 topcoated with MIL-P-24441.

In short-term fresh water immersion exposures, all but one of the commercial primers topcoated with SSPC Paint No. 16 and MIL-P-24441 performed as well as E-303d topcoated with these materials.

The E-303d primed systems were slightly superior to most of the commercial primer systems in the cyclic corrosion weathering test. Three of the commercial primers had performance equivalent to the E-303d systems. The commercial systems performed better in this test with topcoat MIL-P-24441 than with SSPC Paint No. 16. Commercial primer systems performed better than the unprimed system analogs evaluated for cyclic corrosion weathering resistance in a previous study.

Two of the 10 commercial primers performed as well as E-303d in all of the test exposures. Overall the commercial primers performed nearly as well as E-303d. Multiple low-VOC commercial equivalents to E-303d are available for each exposure environment.

Field tests of the most promising primers (Amercoat 68HS, Carboline 858) are recommended. Tests should include fresh and salt water immersion and atmospheric weathering. The performance of each of the primers evaluated in this study should be further studied using commercially available epoxy topcoats from the respective manufacturers of each primer, instead of MIL-P-24441. The use of MIL-P-24441 and other

military specification paints has been restricted by the Corps of Engineers in response to recent procurement reform initiatives. For this reason, a commercial equivalent to MIL-P-24441 is needed. The Corps should specify a coating system comprised of epoxy zinc-rich primer and epoxy topcoat with a defined level of performance. The results of this study and future laboratory and field tests could provide a basis for specifying the performance of this system.

References

- ASTM D 1186, *Standard Test Methods for, Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Base* (American Society for Testing and Materials [ASTM], Philadelphia, PA, 1987).
- ASTM B 117 *Standard Test Method of Salt Spray (Fog) Testing* (ASTM, 1990).
- ASTM D 610 *Standard Method for Evaluating Degree of Rusting on Painted Surfaces* (ASTM, 1989).
- ASTM D 714 *Standard Test Method for Evaluating Degree of Blistering of Paints* (ASTM, 1987).
- ASTM D 1654 *Standard Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments* (ASTM, 1992).
- ASTM G 53 *Standard Practice for Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials* (ASTM, 1991).
- CWGS-09940, *Painting: Hydraulic Structures and Appurtenant Works* (U.S. Army Corps of Engineers, Huntsville Division, Huntsville, AL, 1993).
- Race, Timothy D., and Jeffrey H. Boy, *Laboratory Evaluation of Fusion-Bonded Epoxy Coatings for Civil Works Applications*, Technical Report FM-95/06/ADA291876 (U.S. Army Construction Engineering Research Laboratories [USACERL], January 1995).
- MIL-P-24441, *Paint, Epoxy-Polyamide, General Specification for* (Naval Sea Systems Command, Alexandria, VA, 1991).
- SSPC-SP-5 *White Metal Blast Cleaning* (Steel Structures Painting Council [SSPC], Pittsburgh, PA, 1991).
- SSPC SP-6 *Commercial Blast Cleaning* (SSPC, 1991).
- SSPC Paint Specification No. 16, *Coal Tar Epoxy-Polyamide Black (or Dark Red) Paint* (SSPC, 1991).
- SSPC SP 1 *Solvent Cleaning* (SSPC, 1982).

Appendix: Test Results

Primer Name: E 303 D
 Thinner: None
 Test: Fresh Water Immersion
 Paint System: E 303 D / Mil-P-24441
 Average DFT: Primer: 3.1 Complete System: 11.9

<u>Visual Evaluation:</u>	<u>ASTM D610 rusting</u>	<u>ASTM D714 blistering</u>	<u>ASTM D1654 scribe</u>
Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 6			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: E 303 D
 Thinner: None
 Test: Fresh Water Immersion
 Paint System: E 303 D / SSPC Paint No. 16
 Average DFT: Primer: 3.0 Complete System: 16.9

<u>Visual Evaluation:</u>	<u>ASTM D610 rusting</u>	<u>ASTM D714 blistering</u>	<u>ASTM D1654 scribe</u>
Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 6			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: E 303 D
Thinner: None
Test: 5% Salt Water Solution
Paint System: E 303 D / Mil-P-24441
Average DFT: Primer: 3.0 Complete System: 10.1

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
---------------------------	------------------------------------	---------------------------------------	------------------------------------

Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: E 303 D
Thinner: None
Test: 5% Salt Water Solution
Paint System: E 303 D / SSPC Paint No. 16
Average DFT: Primer: 3.0 Complete System: 16.9

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: E 303 D
Thinner: None
Test: Prohesion / QUV
Paint System: E 303 D / Mil-P-24441
Average DFT: Primer: 3.1 Complete System: 11.5

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10

112 day	10	10	10
---------	----	----	----

Panel No.: 15

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 16

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 17

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 18

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name:

E 303 D

Thinner:

None

Test:

Prohesion / QUV

Paint System:

E 303 D / SSPC Paint No. 16

Average DFT:

Primer: 3.0

Complete System: 17.1

Visual Evaluation:

ASTM D610

ASTM D714

ASTM D1654

rustingblisteringscribe

Panel No.: 13

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 14

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 15

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10

56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 16

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 17

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 18

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name: Ameron Protective Coatings Amercoat 68HS
Thinner: None
Test: Fresh Water Immersion
Paint System: Amercoat 68HS / Mil-P-24441
Average DFT: Primer: 3.3 Complete System: 10.8

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
---------------------------	-----------------------------	--------------------------------	-----------------------------

Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 6			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Ameron Protective Coatings Amercoat 68HS
Thinner: None
Test: Fresh Water Immersion
Paint System: Amercoat 68HS / SSPC Paint No. 16
Average DFT: Primer: 3.5 Complete System: 18.1

	ASTM D610	ASTM D714	ASTM D1654
<u>Visual Evaluation:</u>	<u>rusting</u>	<u>blistering</u>	<u>scribe</u>

Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 6			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Ameron Protective Coatings Amercoat 68HS
Thinner: None
Test: 5% Salt Water Solution
Paint System: Amercoat 68HS / Mil-P-24441
Average DFT: Primer: 3.4 Complete System: 11.4

	ASTM D610	ASTM D714	ASTM D1654
<u>Visual Evaluation:</u>	<u>rusting</u>	<u>blistering</u>	<u>scribe</u>

Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name:	Ameron Protective Coatings Amercoat 68HS
Thinner:	None
Test:	5% Salt Water Solution
Paint System:	Amercoat 68HS / SSPC Paint No. 16
Average DFT:	Primer: 3.8 Complete System: 18.7

	ASTM D610	ASTM D714	ASTM D1654
Visual Evaluation:	<u>rusting</u>	<u>blistering</u>	<u>scribe</u>

Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Ameron Protective Coatings Amercoat 68HS
Thinner: None
Test: Prohesion / QUV
Paint System: Amercoat 68HS / Mil-P-24441
Average DFT: Primer: 3.7 Complete System: 11.0

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name: Ameron Protective Coatings Amercoat 68HS
Thinner: None
Test: Prohesion / QUV
Paint System: Amercoat 68HS / SSPC Paint No. 16
Average DFT: Primer: 3.6 Complete System: 18.9

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name: Carboline - Carboline 858
Thinner: None
Test: Fresh Water Immersion
Paint System: Carboline 858 / Mil-P-24441
Average DFT: Primer: 3.2 Complete System: 10.3

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 6			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Carboline - Carboline 858
Thinner: None
Test: Fresh Water Immersion
Paint System: Carboline 858 / SSPC Paint No. 16
Average DFT: Primer: 3.2 Complete System: 19.1

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 6			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name:	Carboline - Carboline 858
Thinner:	None
Test:	5% Salt Water Solution
Paint System:	Carboline 858 / Mil-P-24441
Average DFT:	Primer: 3.4 Complete System: 10.4

	ASTM D610	ASTM D714	ASTM D1654
<u>Visual Evaluation:</u>	<u>rusting</u>	<u>blistering</u>	<u>scribe</u>

Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Carboline - Carboline 858
Thinner: None
Test: 5% Salt Water Solution
Paint System: Carboline 858 / SSPC Paint No. 16
Average DFT: Primer: 3.6 Complete System: 18.9

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Carboline - Carboline 858
Thinner: None
Test: Prohesion / QUV
Paint System: Carboline 858 / Mil-P-24441
Average DFT: Primer: 3.3 Complete System: 10.0

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name: Carboline - Carboline 858
Thinner: None
Test: Prohesion / QUV
Paint System: Carboline 858 / SSPC Paint No. 16
Average DFT: Primer: 3.5 Complete System: 19.0

	ASTM D610	ASTM D714	ASTM D1654
Visual Evaluation:	<u>rusting</u>	<u>blistering</u>	<u>scribe</u>

Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10

112 day	10	10	10
---------	----	----	----

Panel No.: 16

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 17

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 18

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name:

Deft Inc. 44-G-Y Water Reducible

Thinner:

None

Test:

Fresh Water Immersion

Paint System:

44-G-Y Water Reducible / Mil-P-24441

Average DFT:

Primer: 3.2

Complete System: 10.3

Visual Evaluation:ASTM D610
rustingASTM D714
blisteringASTM D1654
scribe

Panel No.: 1

7 day	10	medium #3 blisters	10
60 day	10	medium #3 blisters	10
120 day	10	medium #3 blisters	10

Panel No.: 2

7 day	10	medium #3 blisters	10
60 day	10	medium #3 blisters	10
120 day	10	medium #3 blisters	10

Panel No.: 3

7 day	10	medium #3 blisters	10
60 day	10	medium #3 blisters	10
120 day	10	medium #3 blisters	10

Panel No.: 4

7 day	10	medium #3 blisters	10
60 day	10	medium #3 blisters	10
120 day	10	medium #3 blisters	10

Panel No.: 5

7 day	10	medium #3 blisters	10
60 day	10	medium #3 blisters	10
120 day	10	medium #3 blisters	10

Panel No.: 6

7 day	10	medium #3 blisters	10
60 day	10	medium #3 blisters	10

120 day 10 medium #3 blisters 10

Primer Name: Deft Inc. 44-G-Y Water Reducible
Thinner: None
Test: Fresh Water Immersion
Paint System: 44-G-Y Water Reducible / SSPC Paint No. 16
Average DFT: Primer: 3.1 Complete System: 18.6

Visual Evaluation: ASTM D610 ASTM D714 ASTM D1654
 rusting blistering scribe

Panel No.: 1
 7 day 10 few #3 blisters 10
 60 day 10 few #3 blisters 10
 120 day 10 few #3 blisters 10

Panel No.: 2
 7 day 10 few #3 blisters 10
 60 day 10 few #3 blisters 10
 120 day 10 few #3 blisters 10

Panel No.: 3
 7 day 10 few #3 blisters 10
 60 day 10 few #3 blisters 10
 120 day 10 few #3 blisters 10

Panel No.: 4
 7 day 10 few #3 blisters 10
 60 day 10 few #3 blisters 10
 120 day 10 few #3 blisters 10

Panel No.: 5
 7 day 10 few #3 blisters 10
 60 day 10 few #3 blisters 10
 120 day 10 few #3 blisters 10

Panel No.: 6
 7 day 10 few #3 blisters 10
 60 day 10 few #3 blisters 10
 120 day 10 few #3 blisters 10

Primer Name: Deft Inc. 44-G-Y Water Reducible
Thinner: None
Test: 5% Salt Water Solution
Paint System: 44-G-Y Water Reducible / Mil-P-24441
Average DFT: Primer: 3.0 Complete System: 10.6

Visual Evaluation: ASTM D610 ASTM D714 ASTM D1654
 rusting blistering scribe

Panel No.: 7
 7 day 10 medium #3 blisters 10
 60 day 10 medium #3 blisters 10
 120 day 10 medium #3 blisters 10

Panel No.: 8
 7 day 10 medium #3 blisters 10
 60 day 10 medium #3 blisters 10
 120 day 10 medium #3 blisters 10

Panel No.: 9
 7 day 10 medium #3 blisters 10

60 day	10	medium #3 blisters	10
120 day	10	medium #3 blisters	10
Panel No.: 10			
7 day	10	medium #3 blisters	10
60 day	10	medium #3 blisters	10
120 day	10	medium #3 blisters	10
Panel No.: 11			
7 day	10	medium #3 blisters	10
60 day	10	medium #3 blisters	10
120 day	10	medium #3 blisters	10
Panel No.: 12			
7 day	10	medium #3 blisters	10
60 day	10	medium #3 blisters	10
120 day	10	medium #3 blisters	10

Primer Name: Deft Inc. 44-G-Y Water Reducible
Thinner: None
Test: 5% Salt Water Solution
Paint System: 44-G-Y Water Reducible / SSPC Paint No. 16
Average DFT: Primer: 3.4 Complete System: 17.2

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Deft Inc. 44-G-Y Water Reducible
Thinner: None
Test: Prohesion / QUV
Paint System: 44-G-Y Water Reducible / Mil-P-24441
Average DFT: Primer: 3.0 Complete System: 10.9

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name: Deft Inc. 44-G-Y Water Reducible
Thinner: None
Test: Prohesion / QUV
Paint System: 44-G-Y Water Reducible / SSPC Paint No. 16
Average DFT: Primer: 3.1 Complete System: 17.9

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	8
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name: DeVoe Coatings Co. Catha-Coat 303H
Thinner: 5% T10
Test: Fresh Water Immersion
Paint System: Catha-Coat 303H / Mil-P-24441
Average DFT: Primer: 3.1 Complete System: 10.9

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
---------------------------	-----------------------------	--------------------------------	-----------------------------

Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 6			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: DeVoe Coatings Co. Catha-Coat 303H
Thinner: 5% T10
Test: Fresh Water Immersion
Paint System: Catha-Coat 303H / SSPC Paint No. 16
Average DFT: Primer: 3.0 Complete System: 18.2

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
---------------------------	-----------------------------	--------------------------------	-----------------------------

Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 6			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: DeVoe Coatings Co. Catha-Coat 303H
Thinner: 5% T10
Test: 5% Salt Water Solution
Paint System: Catha-Coat 303H / Mil-P-24441
Average DFT: Primer: 2.9 Complete System: 10.9

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
---------------------------	------------------------------------	---------------------------------------	------------------------------------

Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 8			
7 day	10	10	10
60 day	10	few #1 blisters	10
120 day	10	few #1 blisters	10

Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 11			
7 day	10	10	10
60 day	10	medium #4 blisters	10
120 day	10	medium #4 blisters	10

Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: DeVoe Coatings Co. Catha-Coat 303H
Thinner: 5% T10
Test: 5% Salt Water Solution
Paint System: Catha-Coat 303H / SSPC Paint No. 16
Average DFT: Primer: 3.1 Complete System: 17.9

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: DeVoe Coatings Co. Catha-Coat 303H
Thinner: 5% T10
Test: Prohesion / QUV
Paint System: Catha-Coat 303H / Mil-P-24441
Average DFT: Primer: 3.2 Complete System: 17.8

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name: DeVoe Coatings Co. Catha-Coat 303H
Thinner: 5% T10
Test: Prohesion / QUV
Paint System: Catha-Coat 303H / SSPC Paint No. 16
Average DFT: Primer: 3.2 Complete System: 17.8

	ASTM D610	ASTM D714	ASTM D1654
<u>Visual Evaluation:</u>	<u>rusting</u>	<u>blistering</u>	<u>scribe</u>

Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10

112 day	10	10	4
Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	4
Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	6

Primer Name: Gavlon Industries Gavlon 9198 Primer
Thinner: None
Test: Fresh Water Immersion
Paint System: Gavlon 9198 Primer / Mil-P-24441
Average DFT: Primer: 3.2 Complete System: 10.8

	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 6			
7 day	10	10	10
60 day	10	10	10

120 day 10 10 10

Primer Name: Gavlon Industries Gavlon 9198 Primer
Thinner: None
Test: Fresh Water Immersion
Paint System: Gavlon 9198 Primer / SSPC Paint No. 16
Average DFT: Primer: 2.8 Complete System: 18.4

Visual Evaluation: ASTM D610 ASTM D714 ASTM D1654
 rusting blistering scribe

Panel No.: 1
 7 day 10 10 10
 60 day 10 10 10
 120 day 10 10 10

Panel No.: 2
 7 day 10 10 10
 60 day 10 10 10
 120 day 10 10 10

Panel No.: 3
 7 day 10 10 10
 60 day 10 10 10
 120 day 10 10 10

Panel No.: 4
 7 day 10 10 10
 60 day 10 10 10
 120 day 10 10 10

Panel No.: 5
 7 day 10 10 10
 60 day 10 10 10
 120 day 10 10 10

Panel No.: 6
 7 day 10 10 10
 60 day 10 10 10
 120 day 10 10 10

Primer Name: Gavlon Industries Gavlon 9198 Primer
Thinner: None
Test: 5% Salt Water Solution
Paint System: Gavlon 9198 Primer / Mil-P-24441
Average DFT: Primer: 3.5 Complete System: 11.9

Visual Evaluation: ASTM D610 ASTM D714 ASTM D1654
 rusting blistering scribe

Panel No.: 7
 7 day 10 10 10
 60 day 10 10 10
 120 day 10 10 10

Panel No.: 8
 7 day 10 10 10
 60 day 10 10 10
 120 day 10 10 10

Panel No.: 9
 7 day 10 10 10

60 day	10	10	10
120 day	10	10	10
Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Gavlon Industries Gavlon 9198 Primer
Thinner: None
Test: 5% Salt Water Solution
Paint System: Gavlon 9198 Primer / SSPC Paint No. 16
Average DFT: Primer: 2.9 Complete System: 18.4

<u>Visual Evaluation:</u>	<u>ASTM D610 rusting</u>	<u>ASTM D714 blistering</u>	<u>ASTM D1654 scribe</u>
Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Gavlon Industries Gavlon 9198 Primer
Thinner: None
Test: Prohesion / QUV
Paint System: Gavlon 9198 Primer / Mil-P-24441
Average DFT: Primer: 3.1 Complete System: 9.9

<u>Visual Evaluation:</u>	<u>ASTM D610 rusting</u>	<u>ASTM D714 blistering</u>	<u>ASTM D1654 scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	4
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name: Gavlon Industries Gavlon 9198 Primer
Thinner: None
Test: Prohesion / QUV
Paint System: Gavlon 9198 Primer / SSPC Paint No. 16
Average DFT: Primer: 3.1 Complete System: 19.4

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	1
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	1
Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	3
Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name: Keeler & Long Inc. No. 7600 Kolor-Poxy H.S. Primer
Thinner: 10% #3700
Test: Fresh Water Immersion
Paint System: No. 7600 Kolor-Poxy H.S. Primer / Mil-P-24441
Average DFT: Primer: 3.1 Complete System: 11.1

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 6			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Keeler & Long Inc. No. 7600 Kolor-Poxy H.S. Primer
Thinner: 10% #3700
Test: Fresh Water Immersion
Paint System: No. 7600 Kolor-Poxy H.S. Primer / SSPC Paint No. 16
Average DFT: Primer: 3.0 Complete System: 17.5

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 6			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name:	Keeler & Long Inc. No. 7600 Kolor-Poxy H.S. Primer
Thinner:	10% #3700
Test:	5% Salt Water Solution
Paint System:	No. 7600 Kolor-Poxy H.S. Primer / Mil-P-24441
Average DFT:	Primer: 3.1 Complete System: 10.4

	ASTM D610	ASTM D714	ASTM D1654
Visual Evaluation:	<u>rusting</u>	<u>blistering</u>	<u>scribe</u>

Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Keeler & Long Inc. No. 7600 Kolor-Poxy H.S. Primer
Thinner: 10% #3700
Test: 5% Salt Water Solution
Paint System: No. 7600 Kolor-Poxy H.S. Primer / SSPC Paint No. 16
Average DFT: Primer: 3.1 Complete System: 18.0

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Keeler & Long Inc. No. 7600 Kolor-Poxy H.S. Primer
Thinner: 10% #3700
Test: Prohesion / QUV
Paint System: No. 7600 Kolor-Poxy H.S. Primer / Mil-P-24441
Average DFT: Primer: 3.1 Complete System: 11.0

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name:	Keeler & Long Inc. No. 7600 Kolor-Poxy H.S. Primer
Thinner:	10% #3700
Test:	Prohesion / QUV
Paint System:	No. 7600 Kolor-Poxy H.S. Primer / SSPC Paint No. 16
Average DFT:	Primer: 3.1 Complete System: 17.9

	ASTM D610	ASTM D714	ASTM D1654
<u>Visual Evaluation:</u>	<u>rusting</u>	<u>blistering</u>	<u>scribe</u>

Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10

112 day	10	10	10
---------	----	----	----

Panel No.: 16

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 17

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 18

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	4

Primer Name:

Poly-Carb, Inc. Mark-59.3

Thinner:

None

Test:

Fresh Water Immersion

Paint System:

Mark-59.3 / Mil-P-24441

Average DFT:

Primer: 3.4

Complete System: 11.3

Visual Evaluation:ASTM D610
rustingASTM D714
blisteringASTM D1654
scribe

Panel No.: 1

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 2

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 3

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 4

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 5

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 6

7 day	10	10	10
60 day	10	10	10

120 day	10	10	10
---------	----	----	----

Primer Name: Poly-Carb, Inc. Mark-59.3
Thinner: None
Test: Fresh Water Immersion
Paint System: Mark-59.3 / SSPC Paint No. 16
Average DFT: Primer: 3.3 Complete System: 18.2

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
---------------------------	-----------------------------	--------------------------------	-----------------------------

Panel No.: 1

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 2

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 3

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 4

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 5

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 6

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Poly-Carb, Inc. Mark-59.3
Thinner: None
Test: 5% Salt Water Solution
Paint System: Mark-59.3 / Mil-P-24441
Average DFT: Primer: 3.4 Complete System: 10.4

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
---------------------------	-----------------------------	--------------------------------	-----------------------------

Panel No.: 7

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 8

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 9

7 day	10	10	10
-------	----	----	----

60 day	10	10	10
120 day	10	10	10

Panel No.: 10

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 11

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 12

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name:**Poly-Carb, Inc. Mark-59.3****Thinner:****None****Test:****5% Salt Water Solution****Paint System:****Mark-59.3 / SSPC Paint No. 16****Average DFT:****Primer: 3.5****Complete System: 18.2**

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
---------------------------	------------------------------------	---------------------------------------	------------------------------------

Panel No.: 7

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 8

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 9

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 10

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 11

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 12

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Poly-Carb, Inc. Mark-59.3
Thinner: None
Test: Prohesion / QUV
Paint System: Mark-59.3 / Mil-P-24441
Average DFT: Primer: 3.3 Complete System: 11.3

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name: Poly-Carb, Inc. Mark-59.3
Thinner: None
Test: Prohesion / QUV
Paint System: Mark-59.3 / SSPC Paint No. 16
Average DFT: Primer: 3.4 Complete System: 18.2

<u>Visual Evaluation:</u>	<u>ASTM D610 rusting</u>	<u>ASTM D714 blistering</u>	<u>ASTM D1654 scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	4
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	8
Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	8
Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	8
Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	6

Primer Name: International Paint 325 Magna-Zinc
Thinner: 10% T5
Test: Fresh Water Immersion
Paint System: 325 Magna-Zinc / Mil-P-24441
Average DFT: Primer: 3.5 Complete System: 11.0

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 6			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: International Paint 325 Magna-Zinc
Thinner: 10% T5
Test: Fresh Water Immersion
Paint System: 325 Magna-Zinc / SSPC Paint No. 16
Average DFT: Primer: 2.8 Complete System: 18.7

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 6			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name:	International Paint 325 Magna-Zinc
Thinner:	10% T5
Test:	5% Salt Water Solution
Paint System:	325 Magna-Zinc / Mil-P-24441
Average DFT:	Primer: 3.2 Complete System: 11.1

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
---------------------------	------------------------------------	---------------------------------------	------------------------------------

Panel No.: 7			
7 day	10	10	10
60 day	10	3 #2 blisters	10
120 day	10	3 #2 blisters	10

Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 11			
7 day	10	1 #2 blister	10
60 day	10	1 #2 blister	10
120 day	10	1 #2 blister	10

Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: International Paint 325 Magna-Zinc
Thinner: 10% T5
Test: 5% Salt Water Solution
Paint System: 325 Magna-Zinc / SSPC Paint No. 16
Average DFT: Primer: 3.0 Complete System: 18.9

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: International Paint 325 Magna-Zinc
Thinner: 10% T5
Test: Prohesion / QUV
Paint System: 325 Magna-Zinc / Mil-P-24441
Average DFT: Primer: 3.2 Complete System: 11.1

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 15

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 16

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	8

Panel No.: 17

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 18

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name:**International Paint 325 Magna-Zinc****Thinner:****10% T5****Test:****Prohesion / QUV****Paint System:****325 Magna-Zinc / SSPC Paint No. 16****Average DFT:****Primer: 3.1****Complete System: 19.0**Visual Evaluation:

ASTM D610

ASTM D714

ASTM D1654

rustingblisteringscribe

Panel No.: 13

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	8

Panel No.: 14

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 15

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10

112 day	10	10	2
Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	6
Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	6

Primer Name: Sherwin Williams Zinc Clad VIII
Thinner: 10% water
Test: Fresh Water Immersion
Paint System: Zinc Clad VIII / Mil-P-24441
Average DFT: Primer: 3.1 Complete System: 9.8

	ASTM D610	ASTM D714	ASTM D1654
<u>Visual Evaluation:</u>	<u>rusting</u>	<u>blistering</u>	<u>scribe</u>

Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 6			
7 day	10	10	10
60 day	10	10	10

120 day	10	10	10
---------	----	----	----

Primer Name: Sherwin Williams Zinc Clad VIII
Thinner: 10% water
Test: Fresh Water Immersion
Paint System: Zinc Clad VIII / SSPC Paint No. 16
Average DFT: Primer: 3.3 Complete System: 18.9

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
---------------------------	-----------------------------	--------------------------------	-----------------------------

Panel No.: 1

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 2

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 3

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 4

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 5

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 6

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Sherwin Williams Zinc Clad VIII
Thinner: 10% water
Test: 5% Salt Water Solution
Paint System: Zinc Clad VIII / Mil-P-24441
Average DFT: Primer: 3.0 Complete System: 10.4

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
---------------------------	-----------------------------	--------------------------------	-----------------------------

Panel No.: 7

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 8

7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 9

7 day	10	10	10
-------	----	----	----

60 day	10	10	10
120 day	10	10	10
Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	3 #2 blisters	10

Primer Name: Sherwin Williams Zinc Clad VIII
Thinner: 10% water
Test: 5% Salt Water Solution
Paint System: Zinc Clad VIII / SSPC Paint No. 16
Average DFT: Primer: 3.2 Complete System: 18.9

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: Sherwin Williams Zinc Clad VIII
Thinner: 10% water
Test: Prohesion / QUV
Paint System: Zinc Clad VIII / Mil-P-24441
Average DFT: Primer: 3.6 Complete System: 11.3

<u>Visual Evaluation:</u>	<u>ASTM D610</u> <u>rusting</u>	<u>ASTM D714</u> <u>blistering</u>	<u>ASTM D1654</u> <u>scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name: Sherwin Williams Zinc Clad VIII
Thinner: 10% water
Test: Prohesion / QUV
Paint System: Zinc Clad VIII / SSPC Paint No. 16
Average DFT: Primer: 3.2 Complete System: 18.9

<u>Visual Evaluation:</u>	<u>ASTM D610 rusting</u>	<u>ASTM D714 blistering</u>	<u>ASTM D1654 scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 15			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 16			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 17			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 18			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name: The Warfield Co., Inc. Alocit Aquacoat 28.15 Zinc
Thinner: None
Test: Fresh Water Immersion
Paint System: Alocit Aquacoat 28.15 Zinc / Mil-P-24441
Average DFT: Primer: 3.0 Complete System: 10.1

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 6			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: The Warfield Co., Inc. Alocit Aquacoat 28.15 Zinc
Thinner: None
Test: Fresh Water Immersion
Paint System: Alocit Aquacoat 28.15 Zinc / SSPC Paint No. 16
Average DFT: Primer: 3.6 Complete System: 16.6

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 1			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 2			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 3			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 4			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 5			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 6			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: The Warfield Co., Inc. Alocit Aquacoat 28.15 Zinc
Thinner: None
Test: 5% Salt Water Solution
Paint System: Alocit Aquacoat 28.15 Zinc / Mil-P-24441
Average DFT: Primer: 3.1 Complete System: 10.3

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
---------------------------	-----------------------------	--------------------------------	-----------------------------

Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: The Warfield Co., Inc. Alocit Aquacoat 28.15 Zinc
Thinner: None
Test: 5% Salt Water Solution
Paint System: Alocit Aquacoat 28.15 Zinc / SSPC Paint No. 16
Average DFT: Primer: 3.0 Complete System: 18.4

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 7			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 8			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 9			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 10			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 11			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10
Panel No.: 12			
7 day	10	10	10
60 day	10	10	10
120 day	10	10	10

Primer Name: The Warfield Co., Inc. Alocit Aquacoat 28.15 Zinc
Thinner: None
Test: Prohesion / QUV
Paint System: Alocit Aquacoat 28.15 Zinc / Mil-P-24441
Average DFT: Primer: 3.1 Complete System: 10.4

<u>Visual Evaluation:</u>	ASTM D610 <u>rusting</u>	ASTM D714 <u>blistering</u>	ASTM D1654 <u>scribe</u>
Panel No.: 13			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10
Panel No.: 14			
7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 15

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 16

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	8

Panel No.: 17

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 18

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Primer Name:

The Warfield Co., Inc. Alocit Aquacoat 28.15 Zinc

Thinner:

None

Test:

Prohesion / QUV

Paint System:

Alocit Aquacoat 28.15 Zinc / SSPC Paint No. 16

Average DFT:

Primer: 3.6

Complete System: 18.1

Visual Evaluation:ASTM D610
rustingASTM D714
blisteringASTM D1654
scribe

Panel No.: 13

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	2

Panel No.: 14

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	2

Panel No.: 15

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10

112 day	10	10	2
---------	----	----	---

Panel No.: 16

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	2

Panel No.: 17

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

Panel No.: 18

7 day	10	10	10
14 day	10	10	10
28 day	10	10	10
56 day	10	10	10
84 day	10	10	10
112 day	10	10	10

USACERL DISTRIBUTION

Chief of Engineers

ATTN: CEHEC-IM-LH (2)

ATTN: CEHEC-IM-LP (2)

ATTN: CECG

ATTN: CECC-P

ATTN: CECC-R

ATTN: CECW

ATTN: CECW-EE

ATTN: CECW-O

ATTN: CECW-P

ATTN: CECW-PR

ATTN: CEMP

ATTN: CEMP-E

ATTN: CEMP-C

ATTN: CEMP-M

ATTN: CEMP-R

ATTN: CERD-C

ATTN: CERD-ZA

ATTN: CERD-L

ATTN: CERD-M

ATTN: CERM

ATTN: DAEN-ZC

ATTN: DAIM-FDP

US Army Engr District

ATTN: Library (40)

US Army Engr Division

ATTN: Library (11)

CEWES 39180

ATTN: Library

CECRL 03755

ATTN: Library

Naval Facilities Engr Command

ATTN: Naval Facilities Engr Service Center 93043-4328

Nat'l Institute of Standards & Tech

ATTN: Library 20899

Defense Tech Info Center 22060-6218

ATTN: DTIC-O (2)

Tennessee Valley Authority

Federal Highway Administration

US Bureau of Reclamation

84
1/96

CONSTRUCTION ENGINEERING RESEARCH LABORATORIES
CORPS OF ENGINEERS
PO BOX 9005
CHAMPAIGN, ILLINOIS 61826-9005

OFFICIAL BUSINESS

BULK RATE
US POSTAGE
PAID
CHAMPAIGN IL
PERMIT NO. 871